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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/055,420	01/23/2002	Xu Wu	60.1377/SDR-067	7263
36822	7590	07/12/2004	EXAMINER	
GORDON & JACOBSON, P.C. 65 WOODS END ROAD STAMFORD, CT 06905			STOCK JR, GORDON J	
			ART UNIT	PAPER NUMBER
			2877	

DATE MAILED: 07/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/055,420

Applicant(s)

WU ET AL.

Examiner

Gordon J Stock

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 April 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2 and 5-25 is/are rejected.
- 7) ☒ Claim(s) 3 and 4 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 July 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>20020607</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Examiner finds the arguments in relation to the election with traverse on 19 April 2004 persuasive. Therefore, the Examiner has withdrawn the election/restriction requirement.

Subsequently, claims 1-25 will be treated for their merits in the action following.

Drawings and Specification

2. Specification is objected to for the following: on page 1 paragraph 3 the applications incorporated by reference need serial numbers.

3. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: the optical fiber having a diameter of between 200 microns and 400 microns of claim 10 lacks antecedent basis. In the specification, the diameter refers to the probe rather than an optical fiber (page 6, line 22); the term “optical fiber” in claims 1-25 lacks antecedent basis, for the disclosure specifically uses the term, probe, rather than optical fiber in the descriptions.

4. The drawings and specification are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: .385 of Figs. 2a, 3a, 4a, and 4b; 60, of Fig. 2d; .28 and .60 of Fig. 3c; 1.0 and .28 of Fig. 4b. In addition, Fig. 3c is objected to for the minor informality: the double arrow does not denote the amount of taper: 5 degrees. Corrected drawing sheets, or amendment to the specification to add the reference character(s) in the description, are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet

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should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. **Claim 18** is rejected under 35 U.S.C. 102(b) as being anticipated by **Sahagen** (5,526,112).

As for **claim 18**, Sahagen in a probe for monitoring a fluid medium discloses an optical fiber having a distal end comprising a portion of a sphere (Fig. 9: ends of 4 and 5).

7. **Claim 22** is rejected under 35 U.S.C. 102(b) as being anticipated by **Adelman** (3,945,371).

As for **claim 22**, Adelman in an apparatus using fibre optics teaches probes having an optical fiber with a numerical aperture below .3, such as .099 (col. 2, lines 44-60; col. 11, lines 4-30)

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. **Claims 1, 2, 5, 6, and 23** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)**.

As for **claim 1**, Sahagen in a probe for monitoring a fluid medium discloses the following: an optical fiber with a flush distal end (Fig. 14a). As for a cubical corner defined by three planes substantially perpendicular to each other, Sahagen suggests this with Fig. 15a with the 4 squared fibers. It would be obvious to one skilled in the art that the system would comprise a distal end comprising a substantially cubical corner defined by three orthogonal planes, for a squared optical fiber used in a flush ended probe such as embodiment 14a would have a distal end comprising four substantially cubical corners each defined by three planes perpendicular to each other.

As for **claim 2**, Sahagen discloses everything as above (see **claim 1** above). In addition, a diagonal from the cubical corner of the squared fiber would be aligned perpendicularly with the longitudinal axis of the fiber by going through the center of the fiber and thereby intersecting the longitudinal axis in order to intersect the opposite cubical corner of the distal end of the squared fiber.

As for **claims 5-6**, Sahagen discloses everything as above (see **claim 1** above). As for the rounded corners, Fig. 15a suggests at least one line is smoothed with the rounding of the corners.

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And Figs. 11 and 12 show rounding. It would be obvious to one skilled in the art that the other two lines of the squared fiber would be rounded if squared fibers are utilized in the spherical and spherical/conical probes for smoothing occurs in the distal ends of the spherical and spherical/conical probes.

As for **claim 23**, Sahagen discloses an optical probe comprising: elongate body that is coupled to the optical fibre probes (see Figs. 2, 6, 7, 21 with two probe configurations: Figs. 24-28). Fig. 14a is one probe arrangement for the optical apparatus. As for a cubical corner defined by three planes substantially perpendicular to each other, Sahagen suggests this with Fig. 15a with the 4 squared fibers. It would be obvious to one skilled in the art that the system would comprise a distal end comprising a substantially cubical corner defined by three orthogonal planes, for a squared optical fiber used in a flush ended probe such as embodiment 14a would have a distal end comprising four substantially cubical corners each defined by three planes perpendicular to each other. And there is a light source to provide waves for emission through the end of the fiber optic (col. 8, lines 28-30). As for the second probe comprising an optical fiber having a distal end as a sphere, Sahagen discloses that another probe configuration may have spherical distal ends (Figs. 9).

10. **Claim 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)** in view of **MacDonald (5,044,723)**.

As for **claim 7**, Sahagen discloses everything as above (see **claim 1**). He is silent concerning a base adjacent cubical corner formed through tapering; whereas, the diameter of the base cubical shape would decrease as it tapers to the distal cubical corner. However, MacDonald in a tapered fibre sensor teaches using tapering to enhance detection for fluids (col. 2, lines 34-

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55) and that square cleaved sensors are not effective probes as tapered structures (col. 1, lines 20-35); whereas, the taper conforms to the shape of the distal end (Figs. 7-8). Therefore, it would be obvious to one skilled in the art to have a base adjacent cubical corner of larger in diameter squared fiber that tapers to the distal end cubical corner of the squared fiber of lesser diameter in order to enhance detection of the fluid probe.

11. **Claims 8-9** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)** in view of **MacDonald (5,044,723)** further in view of **Friedman (5,371,826)**.

As for **claims 8-9**, Sahagen in view of MacDonald disclose everything as above (see **claim 7**). They are silent concerning the taper being less than ten degrees or at most 5 degrees. However, Friedman in a optic light bundle conductor teaches having the taper no more than five degrees for generation of optimal convergent light with minimal light loss (col. 1, lines 50-55; col. 4, lines 3-15). Therefore, it would be obvious to one skilled in the art to have the system have a taper of at most five degrees to minimize light loss and optimize light convergence.

12. **Claim 10** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)** in view of **Wu et al. (6,023,340)**—**cited by applicant**.

As for **claim 10**, Sahagen discloses everything as above (see **claim 1**). He is silent concerning the diameter being from 200 to 400 microns. However, Wu in an optical probe for fluid measuring teaches that 10 to 1000 microns or 100 to 300 microns work well for fiber diameters (col. 7, lines 50-55). Therefore, it would be obvious to one skilled in the art to have the fiber be 200 to 400 microns in diameter, for fluid probes work well with fiber diameters between 10 and 1000 microns.

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13. **Claims 11-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mononobe et al. (6,236,783)**.

As for **claims 11-14**, Mononobe in an optical fiber probe teaches the following: a distal end comprising three conical sections with tapering by having three conical sections of varying diameter and a sharp tip (Fig. 3). The system may also have a rounded tip, which appears to be no more than twenty five percent of the width of the fiber (Fig. 13). As for a 45 ± 2 degree face relative to the axis, he implies that this may be, for the beta angle may be 30 to 90 degrees and the alpha angle 30 or smaller (col. 9, lines 13-30). Therefore, it would be obvious to one skilled in the art that the cone may have a face that is 45 ± 2 degrees relative to the axis, for the beta angle may be between 30 and 90 degrees and the alpha angle may be zero degrees.

14. **Claims 15-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mononobe et al. (6,236,783)** in view of **Friedman (5,371,826)**.

As for **claims 15-16**, Mononobe discloses everything as above (see **claim 14**). He mentions tapering from 10-30 and 30 or less (col. 9, lines 25-35). He is silent concerning the taper being less than ten degrees or at most 5 degrees. However, Friedman in a optic light bundle conductor teaches having the taper no more than five degrees for generation of optimal convergent light with minimal light loss (col. 1, lines 50-55; col. 4, lines 3-15). Therefore, it would be obvious to one skilled in the art to have the system have a taper of at most five degrees to minimize light loss and optimize light convergence.

15. **Claim 17** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Mononobe et al. (6,236,783)** in view of **Wu et al. (6,023,340)**—cited by applicant.

As for **claim 17**, Mononobe discloses everything as above (see **claim 11**). He is silent concerning the diameter being from 200 to 400 microns. However, Wu in an optical probe teaches that 10 to 1000 microns or 100 to 300 microns work well for fiber diameters (col. 7, lines 50-55). Therefore, it would be obvious to one skilled in the art to have the fiber be 200 to 400 microns in diameter, for optical probes work well with fiber diameters between 10 and 1000 microns.

16. **Claim 19** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)** in view of **Bonham, Jr. et al. (5,598,493)**.

As for **claim 19**, Sahagen discloses everything as above (see **claim 18**). He does state that the system may have spherical ends (col. 12, lines 34-36) which suggests a hemispherical shape. In addition, Bonham teaches that an optical fiber routinely has a hemispherical end (col. 1, lines 30-40). Therefore, it would be obvious to one skilled in the art to have the probe comprise a hemispherical distal end for the end may be spherical in shape and that routinely fiber ends are hemispherical in lensing.

17. **Claim 20** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)** in view of **MacDonald (5,044,723)**.

As for **claim 20**, Sahagen discloses everything as above (see **claim 18**). He is silent concerning a base adjacent sphere formed through tapering; whereas, the diameter of the base adjacent spherical shape would decrease as it tapers to the distal spherical end. However, MacDonald in a tapered fibre sensor teaches using tapering to enhance detection for fluids (col. 2, lines 34-55); whereas, the taper conforms to the shape of the distal end (Figs. 7-8). Therefore, it would be obvious to one skilled in the art to have a base adjacent sphere of larger in diameter

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than the distal end spherical shape that tapers to the distal end of lesser diameter in order to enhance detection of the fluid probe.

18. **Claim 21** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)** in view of **MacDonald (5,044,723)** further in view of **Friedman (5,371,826)**.

As for **claim 21**, Sahagen in view of MacDonald disclose everything as above (see **claim 20**). They are silent concerning the taper being less than ten degrees. However, Friedman in a optic light bundle conductor teaches having the taper no more than five degrees for generation of optimal convergent light with minimal light loss (col. 1, lines 50-55; col. 4, lines 3-15). Therefore, it would be obvious to one skilled in the art to have the system have a taper of be less than ten degrees for a taper at most at five degrees minimizes light loss and optimizes light convergence.

19. **Claim 24** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)** in view of **Adelman (3,945,371)**.

As for the second probe comprising an optical fiber having a distal end as a sphere, Sahagen discloses that another probe configuration may have spherical distal ends (Figs. 9). And demonstrates the differing acceptance angles of the probe configurations (Figs. 14a, 15a, 9). As for having two probes of differing configurations, it is implied by Sahagen's multiple probe configurations with systems comprising at least two probes. In addition, Adelman in an inspection system discloses the use of two different probes for different resolutions (col. 11, lines 3-35). Therefore, it would be obvious to have the system comprise two different probe configurations such as the cubical corner distal end and the spherical end to ensure differing resolutions depending on functional need.

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20. **Claim 25** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Adelman (3,945,371)** in view of **Allison et al. (5,812,729)**.

As for claim 25, Adelman in a fiber optic inspection system discloses the following: an elongate housing with power source and two types of probes with a numerical aperture of .099 and one with a .56 NA (col. 11, lines 3-35; Fig. 1; col. 2, lines 30-60; col. 4, lines 5-40). As for having a numerical aperture above .8, Adelman discloses that a relatively high numerical aperture of .3 to .8 will give a short depth of focus (col. 2, lines 45-47). Allison in a very high numerical aperture light transmitting device teaches that numerical apertures may be .92 and above (Figs. 1 and 3). Therefore, it would be obvious to one skilled in the art to have the short depth of focus probe fiber have a numerical aperture above .8 such as .92 to increase acceptance angle of the probe end and to further shorten depth of focus.

Allowable Subject Matter

21. **Claims 3-4** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to **claim 3**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an optical apparatus for investigating a fluid stream “an incident angle of light at each of said three planes is 54.73 +/- 1 degrees,” in combination with the rest of the limitations of **claim 3**.

As to **claim 4**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an optical apparatus for investigating a fluid stream “said optical fiber

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terminates at a sharp tip where said three planes meet" in combination with the rest of the limitations of **claim 4**.

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

- 1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and
- 2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: (703) 872-9306

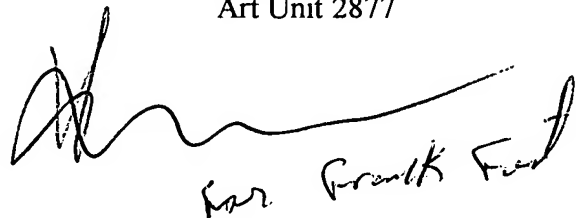
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431. The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.



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July 8, 2004

Kaveh Kianni
Patent Examiner
Art Unit 2877


for Grant Fend